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SCIENTIFIC AGRICULTURE.

BY FRANCES EVELYN, COUNTESS OF WARWICK.

It has been cynically set down as characteristic of the average Englishman that he does the best possible things in the worst possible way. Given a perfect site, like Trafalgar Square, the inappreciative Londoner fills it with Landseer lions, squirting fountains, and a Nelson Column, and he crowns the whole with a pepper-box perched on the National Gallery; while the resourceful Parisian, with far inferior advantages, makes the Place de la Concorde a thing of beauty and a joy forever. Perhaps this is true, and possibly from the foot you may judge Hercules.

In like manner, and as another illustration of the same phase of character, the English farmer, with a soil above reproach, and a climate—whatever may be said against it—free from the vicious extremes of drought and deluge, has not made as much as he might have made out of his broad acres; and the Englishman even now dreads defects in his navy, not from any abstract fear of invasion, but from the exceedingly concrete alarm lest some foreign foe may intercept those merchant ships by means of which he is fed at the hand of other nations, as literally as though John Bull were a great grown-up child.

He is going to change all this—is, indeed, in process of doing so; but, like all his changes, this altered *modus operandi* in agriculture comes about very slowly, and is made only after its advocates have been for a long while denounced as faddists. When it is adopted by and by, it will be rushed and carried to any extent, just as, after scraping chin and cheek for ages, John Bull woke up one morning and found himself bearded like the pard.

Perhaps, however, in the special department of agriculture this neglect of opportunities, and failure to keep pace with the times, is less a national peculiarity than one ingrained in the subject.

Even the sometimes boastful Frenchman owns the impeachment of neglect in this special pursuit, as a distinguished French Professor acknowledged. Said M. Berthelot, addressing the Agricultural Society of France:

> "The good old times of ignorance raised to a principle have passed away. Science cannot be reserved for a narrow oligarchy. It is important that all the citizens of a free country shall share in the highest ideal. No ideal is superior to that of agriculture. Country life is the normal type of human life. In it only can manhood be developed in its plenitude. Country life favors at once material health of body and moral soundness of mind. The robust, industrious and intelligent countryman has always constituted the strength of nations."

But the ideal rustic seems to have contented himself, all the world over, with resting on that fact. He appears to have taken it for granted—this happy, healthy rustic—that what did for his forefathers will do for him. Other departments of life have their developments and go with the times, but who ever dreamed of calling agriculture a science, or pursuing it by scientific methods?

Well, the schoolmaster—often identified with the faddist—is abroad, and has found a good deal of late years, to teach his somewhat rebellious pupils.

First and foremost, here in England, he is pointing out, and we "cannot choose but hear," that the land has been allowed to go out of cultivation, until we have become to a very dangerous extent dependent on foreign nations for our foodstuffs, and if by chance, in these days of quick changes, we should find ourselves "isolated," as the contumacious clergy are by their bishops, we should be at a loss to get the wherewithal for a square meal. This is the point that is being constantly mentioned, though with bated breath, in England; and the possibility of such a danger results from the twofold cause that the land has been allowed to go uncultivated, and that we have neglected to keep pace with the times in treating what is under culture. Possibly the two causes resolve themselves into one. People do not neglect a remunerative occupation; and, if intelligence had been brought to bear on agriculture, it would have paid so well that there would have been no temptation to relinquish it in favor of other pursuits. The rural exodus would not have occurred, and overcrowding in city populations would have been avoided.

Our contention is that the soil of England is sufficient to feed the population: that there are more than adequate supplies of labor available (we have our own special "fad" on that subject, of course), and that the missing link is the non-application to this particular science of the method which we apply to all other sciences. In one word, we degrade agriculture from its position as a science. We fail to realize that it is a science.

Why? Doubtless, in the first instance, on account of its immemorial antiquity. It dates from the beginning of things. The earliest occupation of aboriginal man—*and* woman, I personally may be allowed to remark—was to dress the garden and to till the ground. I must ask to be allowed the luxury of an occasional first person singular pronoun; and I would say that I include under the one science, for the purpose of this thesis, the twin occupations of agriculture and horticulture, just as I myself make no distinction between the male and female laborer on the soil. These are the initial sciences. With regard to any new upstart of a science, like geology, biology, or even phrenology, which are, by comparison, things of yesterday, no difficulty whatever is felt in giving them due rank and precedence; but, because agriculture dates back to hoar antiquity and has its archives in Egypt, Mesopotamia and China, we reverse our ordinary reverence for age, and seem to think that any rule-of-thumb work is good enough for the tiller of the ground.

Of course, it is easy to torture this attitude of neglect into its exact opposite, and to say, as if enunciating some fine old crusted Conservative maxim, that, by taking agriculture out of the category of ordinary sciences, we are exempting it from the fluctuations to which more recent sciences are liable. The plough, we submit, is now virtually the same implement as Hesiod describes in his "Works and Days," or Virgil in his poem on Husbandry. That is all very true, but quite inconclusive. Agriculture has not stood still; and if the agriculturist thinks fit to assume an attitude of stagnation, he will simply be left behind in the race of progress.

Now, it is something to have got this fact enunciated by a real live professor at one of our ancient English Universities, which are often certainly identified with a dead and buried past. "A hundred years ago," said the Sibthorpian Professor of Rural Economy at Oxford, by way of claiming for Agricultural Science a place in a University Education, "Agricultural Science was almost exclusively associated with botany. The term Agricultural Chemistry, now so familiar, comes first into prominence as the title of Sir Humphry Davy's lectures before the Board of Agriculture, published in 1813." Biology, too, has its sphere in the various problems connected with the soil. "Our knowledge of the life and work of the minute living organisms dwelling in the soil," says the same Professor, "is as yet only commencing; but the facts already learned respecting the functions discharged by several species of them are so remarkable that they will rank among the chief discoveries of the century." It is well pointed out that, a hundred years ago, agriculture was only an art having few points of contact with natural science. But the term Agricultural Science is no longer a misnomer. To speak of geology as a natural science, and to deny the same rank to the modern science of agriculture, is utterly illogical. Outside pure mathematics, all our sciences are more or less mixed. They are groups of facts related to each other, but with special reference to some definite subject. Such is the case with chemistry, physics, botany, physiology, and such, too, is the case with agriculture. It is as much a department of science as geology or medicine. As practised by the average farmer, it is an art. As taught by the professor, it may be pure science; but the ideal scientific agriculture is that combination of profession with practice which constitutes a mixed science, and more than justifies the expression "Scientific Agriculture."

In 1893, the Royal Agricultural Society passed a resolution to the following effect: That, in the opinion of the Royal Agricultural Society of England, it is desirable that provision be made in all Universities for the granting of a degree in Science for students of agriculture. The importance of the subject has, for more than a century, been recognized in the Scotch Universities; and, in the University of Durham, agriculture has since 1890 been among the subjects qualifying for a degree in Science. More recent still is the work done by the University Extension College at Reading, where the curriculum is in itself a justification of the scientific status occupied by agriculture. The subjects are: (1) Agriculture proper; (2) Chemistry; (3) Biology; (4) Mathematics; (5) Geology; (6) Engineering; (7) Physiology and Hygiene, etc.

It is satisfactory to reflect that this identification of agriculture with such a galaxy of recognized sciences has not been reached *per saltum,* by a hop, skip and a jump, but in the due and orderly course of evolution. To be, for one moment, chronological, we may look back so far as the period of the wars that grew out of the French Revolution. At this epoch, say from 1795 to 1814, the price of provisions gave a great stimulus to agriculture in England. The Royal Agricultural Society, however, was not founded until 1838. Its objects were avowedly to encourage improvements in agriculture, such, for instance, as the application of chemistry thereto, the study of mechanics and engineering for the construction of agricultural implements, of botany for variations in grain, and forestry for the development of different growths.

Prominent among the provisions of the century stand the processes of deep ploughing and thorough draining; the construction of the steam-plough, of reaping and threshing machines; the chemical combination of artificial manures, and the use of ensilage. Surveying these advances along different lines of science, some optimists have not hesitated to say that the agriculture of Great Britain has more than kept pace with that of other countries. And it is really refreshing to be able to entertain such an estimate, just at a time when alarmists are crying out that our trade has emigrated to Germany, and our military prestige vanished into thin air. What if, after all, a revived and scientific agriculture should be destined to form for England the Great Compensation!

Orderly though the development of our science has been, then, from 1815 to the present the advance has been by leaps and bounds, especially in the departments of machinery, chemistry, and that organic faction of the latter science which trenches on physiology. It is well to regard the circles of expansion in that order, taking machinery as the earliest or most rudimentary. This, when we come to think of it, represents nothing beyond the manipulation of material. It creates nothing; but merely aids and increases the productive force of nature. Chemistry is the great agent, especially in the way of artificial fertilizers; and the part of physiology is one that suggests endless possibilities, as, for instance, in the prolongation of human life, and the protection of lower animal life against epidemics. The science of selection has yet its work to make in the department of agriculture; but the possibilities are boundless and full of encouragement, based as they are on the study of living nature.

One word more—one additional Professor to complete my trio—a final subsidence into the first person singular, and I have done.

It is, of course, on such a subject as this, distinctly advantageous to get the testimony of *savants,* and especially so when they are not, as was the case with M. Berthelot and with the Sibthorpian Professor, enlightening their audiences on this special subject, but just throwing a side-light which is all the more valuable because unstudied.

Professor Francis William Newman, brother of the Cardinal and formerly occupant of the Latin Chair in London University, wrote on the subject of Diet, with the special object of glorifying Vegetarianism. With that, or any other of his "isms" (which were many), we are not concerned. Taking the two aboriginal pursuits of pasturage and tillage, however, the "Emeritus" Professor, as he delighted to call himself, brought the full force of his heavy statistics to bear on this project of Scientific Agriculture. He takes the advance from hunting, *via* pasturage, to tillage as marking distinct grades in the development of civilization, the transition from pasture to agriculture being even more marked than the substitution of tame cattle for quarry; and, with special reference to agriculture in England, Professor Newman finds special importance in the fact that, on an island limited in size like Great Britain, "to produce as much human food as *one* acre of cultivated land will yield, *three* or even *four* acres of grazing-land are needed."

Putting professors out of the question, however, and treating the subject as one of ordinary experience, with which any person of average intelligence is qualified to deal, it is obvious that agriculture must, like everything else, keep pace with the times. There are, at all events in nature, no exceptions. All goes by rule, and all must conform to the law of progress. It would be no advantage to agriculture to perch it on a pedestal and insist on keeping it just as it was in the days of our grandsires. On the contrary we must bring it down to the level of ordinary life, and give it every advantage we can from progressive discoveries. Then, and then only, can we with any confidence say of a science as to which the aspiration is peculiarly appropriate—"*Floreat!*"

F. E. WARWICK.